The case is rather different with regard to Leaders of Art, to whom, if to any, the somewhat misleading term ' genius ' is best applied. Here we cannot feel at all so certain that similar men would have arisen, but it is interesting in this connection to note how the Leaders of Art had a tendency to appear in the smaller families.

On the whole, it would seem that provided the better stocks do not practically disappear, we may still feel assured of a due supply of great organizers and great scientists, but we may, and probably shall, find a certain diminution in the numbers of ' Leaders of Art.'

In conclusion, it may be remarked that if only about one-half of the great men of English history have left posterity, the proportion of descendants from their parents must be far greater, and probably in every single instance descendants are in existence of their grandparents.

THE GENERAL POPULATION

By M. C. Buer, D.Sc.

IN comparing Mr. Gun's very interesting figures with those available for the general population, the first difficulty which is encountered is the extreme paucity of vital statistics before the nineteenth century. Though, perhaps, generally known to the readers of the EUGENICS REVIEW, it may be well to recall the fact that the first effective census in this country was in 1811 and that the civil registration of births and deaths was only introduced in 1837. The fact that before 1837 the only birth-rate figures available for the general population are those of a defective registration of *baptism,* is in this particular instance not important, as Mr. Gun's figures are ultimately, doubtless, derived from a similar source. We are, in fact, up to 1837 comparing not births, but two sets of registered baptisms; and neither set is comparable with modern birth-rate figures without correction. For the total population the correction from registered baptisms to births is usually taken to be an increase of at least one-sixth and probably of one-fifth. There is, naturally, no data for making the correction in regard to Mr. Gun's families, but the probability is that, owing to their social status, the correction would be lower, rather than higher, than that for the general population.

Mr. Griffith[1] calculated the baptismal rate per marriage (fertile and sterile combined) for several periods, none of which exactly correspond to Mr. Gun's; but, speaking roughly, Mr. Griffith's figures for baptisms per marriage are—from 1775 to 1800, 3.6; and from 1800 to the decade 1830-40, about 3.7. There are no figures for the general population upon which any reliance can be placed before the second half of the eighteenth century. Before 1754 the marriage register was most unreliable, while in the decade 1830-40, the introduction of civil registration caused confusion in the figures. After that decade we pass from a baptism rate to a birth rate, but registration was not fully effective until 1876. In the decade 1875-84 the birth rate per marriage was 4.5, and after that decade it began to drop. Farr had calculated the fertility rate per marriage in 1830 as 4.2, but the apparent rise in later years may have been due to an underestimate by Farr of the defects of the baptismal register.

It may be interesting to give the number of baptisms (illegitimate excluded) per mar-

riage, as calculated from the parish registers of Tavistock and published in the *Journal of Statistics* for 1841.[2]

1617–1686	4·09
1687–1736	3·94
1737–1786	2·97
1787–1836	3·73
1617–1836	3·68

Turning now to a comparison of Mr. Gun's figures with those available for the general population. It must first of all be pointed out that his numbers are necessarily small, and that his families include single men and are spread over a long period, during which conditions changed very considerably; and that no figures are available for the general population for a great part of that period. A comparison based upon random samples taken from the general population, if it were possible to obtain it, might give a better result. But, taking the figures for what they are worth, it would seem that they indicate a distinctly higher fertility among Mr. Gun's eminent people than that of the population as a whole in the first period and a lower in the second.

It must be borne in mind that nearly all of the selected families belong to the middle and upper classes, among whom it has been generally agreed that at all periods for which data are available, the birth rate has been lower than that of the mass of the people. This difference may be due to social factors dependent upon social and economic status, rather than upon inborn characteristics associated with intellectual eminence. The most important of these social factors is the earlier marriage among the lower classes and also the widespread prevalence until the mid-nineteenth century, especially in rural districts, of deliberate pre-marital intercourse, upon which marriage only followed in the event of pregnancy. This custom necessarily lowered the proportion of infertile marriages among the classes following it. The slightly higher rate shown in recorded births per marriage by eminent men before 1800, as compared to the general population, may very likely be accounted for by better registration.

TABLE 2.—GENERAL POPULATION

Baptism Rate per Marriage	*Birth Rate per Marriage.*
1 { 1775–89 ... 3·7	
1 { 1785–99 ... 3·6	
1 { 1800–24 ... 3·8	
1 { 1820–29 ... 3·7	
1 { 1825–34 ... 3·6	
1830 (*circa*) ...	... (estimated) 4·2
1875–84	4·5

(These and the preceding figures of Dr. Buer have been added to Table I in the "General Population" lines.)

REFERENCES:
[1] G. T. Griffith, B.A., *Population Problems of the Age of Malthus* (1926).
[2] Charles Barham, M.B., *Journal of Statistics*, Vol. IV, p. 34 (1841).

EDITOR'S NOTE: The most important point to notice about Dr. Buer's additions, "General Population," to Table 1, is that they represent the average size of family per *marriage* (fertile and infertile), while the other figures in the last column represent the average size of family for *all* the great men considered, married with children, married and childless, and single. Her figures, therefore, have been divided by too small, or Mr. Gun's by too large a number—whichever way the reader cares to look at it—for the two to be strictly comparable. Her calculations are per married woman, and his per adult male. Population data is too scanty or inaccurate to permit Dr. Buer's figures to be converted to the form of Mr. Gun's; and his have been given their final form in the last column (all fertile and all sterile combined), in order to show whether or not the great men as a whole group had adequately perpetuated themselves—obviously they have, and with a small margin for increase, though the Leaders of Thought after 1800, if taken by themselves, produced too few children to replace them and their wives.

FERTILITY FULLY ADEQUATE

But we also want to know whether the whole group of great men had a rate of increase (by birth alone) greater or less than that of the general population; and to discover this it is necessary to put Mr. Gun's data in the form of Dr. Buer's. This is easily done by dividing the number of children not as before, by the number of great men, but by the number of them that married. For All Leaders, Action, Thought, and Art, this gives an average size of family per marriage of 3.8 before 1800, and of 3.14 during the nineteenth century.

It seems, therefore, that up to 1800 our great men were not only perpetuating their stock, with a margin of increase, but were doing so slightly faster than the general population—unless, that is, the difference is solely due to better registration. Moreover, their death rate was probably a little lower than the country's average, and—though Dr. Buer may not agree—their marriage rate may well have been a little higher. Illegitimacy, on the other hand, would probably reduce the odds in their favour.

But it is not wise to restrict our survey only to the Leaders themselves, since it is now generally believed that the outstanding genius is simply a happy chance combination—sometimes even an ill-balanced one—of good, but not great, genetic qualities. This view is in entire accordance with the modern development of old-fashioned mendelism into the science of physiological genetics, and it offers one reasonable explanation of the fact that so few geniuses have produced children of their own standard. If it is correct, then the great man's qualities, but not his peculiar combination of them, will, on the average, be handed on just as well by his brothers and sisters as by himself. (The other and main reason for the lack of outstanding merit in great men's children is, of course, the comparative mediocrity of their wives.)

Hence, if we want to know the survival value of those fine human qualities which have enriched our nation in the past, we must pay just as much attention to the families which have produced great men as to the fertility of the great men themselves. These families (Table 1, last two figures in penultimate column) apparently were considerably larger even than those the fertile Leaders produced. Actually, however, the difference is comparatively slight, since, as Dr. R. A. Fisher has been good enough to point out, parents, statistically speaking, always produce larger families than do their children. There is, all the same, a slight, but definite difference between the fertility of Leaders and that of their parents in both periods, though greater after than before 1800. (These figures in the penultimate column, of course, are not comparable with Dr. Buer's, since they are only of fertile families.)

If we suppose, as seems legitimate and erring on the side of caution, that the sibs of the Leaders married and had families as frequently as their great brethren, but produced, when fertile, families of the same size as their parents before them, then there seems no doubt that the genius-producing stocks were steadily on the increase right up to the beginning of the nineteenth century. It may, of course, be an inevitable lack of perspective which finds so many Leaders during the nineteenth century itself, compared with the proportions produced by the previous long centuries. But may it not also be that during those centuries, with their high birth rate among such stocks, there was built up a store of potential ability which blossomed forth in the nineteenth century and actually produced an unprecedented proportion of great men?

THE NINETEENTH CENTURY CHANGE

The Leaders in that century itself still produced enough children, barring high mortality, to allow the group as a whole to increase, but not, even with the revised figure of 3.14 per marriage, to increase as fast as the general population at the lowest figure given by Dr. Buer, 3.7. Even if we again assume that the sibs were as fertile as their parents but produced only as many families as the Leaders themselves, the joint average figure per marriage would not equal

that of the lowest estimate for the general population. And at this period illegitimacy would almost certainly raise the general figure more than that of the Leaders. Evidently the differential birth rate, as we now know it, set in fairly early in the century. It is beyond doubt that contraception of a sort was known and practised, probably by the upper social strata, long before the Bradlaugh-Besant trial; while the Registrar-General's returns show that as early as 1851 the poorest London boroughs were a little more fertile than the richest.

Differential mortality probably acted in favour of the Leader group, while the age and rate of marriage was in all likelihood against it.

Judging from such data as is available, the position to-day is distinctly more depressing.

THE ADVANTAGES OF INFERTILITY

The slight contrast in both periods between the size of the families from which the Leaders sprang and the size of those which even the fertile among them produced, is another illustration of a phenomenon which has been much discussed. There seems to be an essential connection between comparative infertility and success. The cause may not be always nor necessarily biological, and, other things being equal, may perhaps be summed up in Kipling's words:

White hands cling to the bridle rein. . . .
He travels fastest who travels alone.

The fullness with which Mr. Gun has given his data in Table 3 (at the end) enabled the construction of Table 1 and the foregoing discussion of the most important aspects of the subject. But it also throws light on other aspects of human biology and affords the raw material for further investigations. It should, for instance, be possible to trace the inheritance of fertility by correlating the families produced by parents and children. Since Mr. Gun further gives the dates of birth and death, it should also be possible to establish the connection, if any, between longevity, marriage, and fertility.

ON TAKING THOUGHT

Certain other points of interest leap to the eye. Looking, for instance, at the net fertility in the last column, one would conclude from the comparatively poor showing of the Leaders of Thought, that in order to think great thoughts it is necessary to retire, on the Roman Catholic principle, not only from the world, but also from family cares. But the penultimate column, which gives the average family of the fertile alone, flatly contradicts this conclusion and seems to imply that the larger the family, the greater the thought! In both periods and over an era of nearly four hundred years the Thinkers, when they have chosen to breed at all, have outdone both Artists and Men of Action, and have even surpassed the highest figure for the proliferation of the proletariat.

The very low *net* figure of the Thinkers after 1800 suggests, rather as one would expect, that such of them as wished for the joys without the cares of marriage, were the first to hear of contraception and anticipated the feckless Artists and even the practical men in putting it to use.

THE MARRIAGE AND BIRTH RATES

This subject seems to have a connection with the contrast, mentioned by Mr. Gun, between the early period, with its high celibacy and high fertility in marriage, and the later period, with its low celibacy and lower fertility in marriage; for the changed habits of the Thinkers seem largely responsible for the contrast. In the earlier period they were divided, as we have said, into the celibates and the highly fruitful, the former being forced to purchase the contemplative repose they needed by sacrificing all hopes of married life. But their successors of the nineteenth century apparently found even greater peace in a married life rendered contraceptively secure. The contrast is not confined to philosophy, but seems to be characteristic of ordinary populations. Catholic, uncontraceptive Connaught only recently had approximately the same birth rate per 1,000 as Protestant, contraceptive England —but instead of many marriages and small families, the Irish achieved that result by

many celibates and large families. Such indications as can be resurrected from old records suggest that the Irish method was usual in both England and France before the nineteenth century. Birth control, in so far as it is effective, seems to distribute the births among many marriages, rather than to restrict their total number.

TABLE 3.—THE MEN AND THEIR FAMILIES

NOTE.—In column 2, Category, 1 indicates Leader of Action, 2 of Thought, and 3 of Art. In column 5, M and S distinguish the married from the single. The dividing line between before and after 1800 is drawn between Pitt and Wilberforce. A small "H" against a figure in column 6 indicates that half-sibs of the Leader have been included.

1 Name	2 C't'g'ry	3 Birth	4 Death	5 Child'n	6 Ch'd'n of Parents
Dean Colet	1	1467	1519	S—	22
Sebastian Cabot ...	1	1474	1557	S—	unc'tn
Wolsey	1	1475	1530	S—	unc'tn
Thomas More ...	2	1478	1535	4	4
Tyndale	2	?	1536	S—	unc'tn
Archbishop Parker	1	1504	1575	5	H4
John Knox ...	1	1505	1572	5	2
Thomas Gresham ...	1	1519	1579	2	4
Burleigh	1	1520	1598	4	4
Walsingham ...	1	1530	1590	1	6
Frobisher	1	1535	1594	M—	5
Drake	1	1540	1596	M—	unc'tn
John Napier ...	2	1550	1617	12	H4
Edmund Spenser ...	3	1552	1599	4	unc'tn
Raleigh	1	1552	1618	3	H8
Edward Coke ...	2	1552	1634	12	8
Hugh Myddelton	2	1560	1631	9	5
Francis Bacon ...	2	1561	1626	M—	8
Robert Cecil ...	1	1563	1612	3	H4
Shakespeare ...	3	1565	1616	3	5
Ben Jonson ...	3	1573	1637	4	1
Inigo Jones ...	3	1573	1652	S—	4
William Harvey ...	2	1578	1637	M—	6
Orlando Gibbons ...	3	1583	1625	7	7
Selden	2	1584	1654	S—	unc'tn
Francis Beaumont	3	1584	1616	2	4
Pym	1	1584	1643	5	2
Hobbes	2	1588	1679	S—	2
Herrick	3	1591	1674	S—	7
Strafford	1	1593	1641	5	6
Isaac Walton ...	3	1593	1683	10	unc'tn
Hampden	1	1594	1643	9	2
Vandyke	3	1599	1641	2	12
Robert Blake ...	1	1599	1657	S—	11
Cromwell	1	1600	1658	7	10
Milton	3	1608	1674	3	4
Clarendon	1	1609	1674	6	5
George Fox ...	1	1624	1691	M—	5
Robert Boyle ...	2	1627	1691	S—	13
Bunyan	3	1628	1688	6	2
Dryden	3	1631	1700	3	7
Locke	2	1632	1704	S—	2
Wren	3	1632	1723	4	7
Pepys	3	1633	1703	M—	12
Newton	2	1642	1727	S—	H3
Penn	1	1644	1718	13	3
Marlborough ...	1	1650	1722	5	5
Halley	2	1656	1742	5	1
Purcell	3	1658	1695	6	2
Defoe	3	1661	1731	5	unc'tn
Swift	3	1667	1745	S—	1
Addison	3	1672	1719	M—	5
Robert Walpole ...	1	1676	1745	5	6
Handel	3	1685	1759	S—	H9
Pope	3	1688	1744	S—	1
Hogarth	3	1697	1764	M—	3
John Wesley ...	1	1703	1791	M—	15
Mansfield	2	1705	1793	M—	6
Fielding	3	1707	1754	5	6
Chatham	1	1708	1778	5	5
Samuel Johnson ...	2	1709	1784	S—	2
Hume	2	1711	1776	S—	3
Thomas Gray ...	3	1716	1771	S—	12
Horace Walpole ...	3	1717	1797	S—	H5
Garrick	3	1717	1779	M—	7
Rodney	1	1719	1792	7	4
Gilbert White ...	3	1720	1793	S—	11
William Robertson	2	1721	1793	5	9
Adam Smith ...	2	1723	1790	S—	1
Reynolds	3	1723	1792	S—	11
Clive	1	1725	1774	4	7
Wolfe	1	1727	1759	S—	2
Gainsborough ...	3	1727	1788	S—	9
James Cook ...	1	1728	1779	7	8
John Hunter ...	2	1728	1793	4	10
Goldsmith	3	1728	1774	S—	8
Burke	2	1729	1797	1	4
James Bruce ...	1	1730	1794	2	9
Wedgwood ...	3	1730	1795	7	13
Cowper	3	1731	1800	S—	7
Arkwright	2	1732	1792	2	13
Warren Hastings	1	1732	1818	M—	1
Romney	3	1734	1802	2	11
Ralph Abercromby	1	1734	1801	7	6
St. Vincent ...	1	1735	1823	M—	4
James Watt ...	2	1736	1819	4	5
Gibbon	2	1737	1794	S—	7
William Herschel ...	2	1738	1822	1	9
Boswell	3	1740	1795	3	3
Grattan	1	1746	1820	4	8
Bentham	2	1748	1832	S—	2
Jenner	2	1749	1823	3	6
Charles Fox ...	1	1749	1806	M—	3
Erskine	1	1750	1823	8	4
Sheridan	3	1751	1816	3	5
Fanny Burney ...	3	1752	1840	M—	6
Flaxman	3	1755	1826	M—	H3
Mrs. Siddons ...	3	1755	1831	5	12
Nelson	1	1758	1805	1	11
Robert Burns ...	3	1759	1796	5	7
Pitt	1	1759	1806	S—	5
Total to 1800—101	—	—	—	**274**	**568**

1 Name	2 C't'g'ry	3 Birth	4 Death	5 Child'n	6 Ch'd'n of Parents
William Wilberforce	1	1759	1833	6	4
Wellesley	1	1760	1842	2	6
John Moore ...	1	1761	1809	S—	7
Malthus	2	1766	1834	2	6
Castlereagh ...	1	1769	1822	M—	H9
Wellington ...	1	1769	1852	2	6
George Canning ...	1	1770	1827	4	1
Wordsworth ...	3	1770	1850	3	6
Walter Scott ...	3	1771	1832	3	12
Mungo Park ...	1	1771	1806	4	13
S. T. Coleridge ...	3	1772	1834	3	9
Charles Lamb ...	3	1775	1834	S—	7
Dundonald	1	1775	1860	5	5
Jane Austen ...	3	1775	1817	S—	7
J. M. W. Turner ...	3	1775	1851	S—	1
O'Connell	1	1775	1847	7	10
Constable	3	1776	1837	7	6
John Ross	1	1777	1856	1	4
Humphry Davy	2	1778	1829	M—	5
Elizabeth Fry ...	1	1780	1845	5	9
George Stephenson	2	1781	1848	1	6
Stamford Raffles ...	1	1781	1826	5	2
Palmerston ...	1	1784	1865	M—	4
Stratford Canning ...	1	1786	1880	4	5
John Franklin ...	1	1786	1847	1	12
Edmund Kean ...	3	1787	1833	1	1
Peel	1	1788	1850	7	9
Byron	3	1788	1824	2	H2
William Hamilton ...	2	1788	1856	3	9
William Parry ...	1	1790	1855	2	5
Faraday	2	1791	1867	M—	5
Shelley	3	1792	1822	3	6
John Herschel ...	2	1792	1871	12	1
Rowland Hill ...	2	1795	1879	4	8
Keats	3	1795	1821	S—	4
Carlyle	2	1795	1881	M—	9
Charles Barry ...	3	1795	1860	8	5
Lyell	2	1797	1875	M—	10
Macaulay	2	1800	1859	S—	9
Newman	2	1801	1890	S—	6
Cobden	1	1804	1865	2	11
Disraeli	1	1804	1881	M—	5
J. S. Mill	2	1806	1873	M—	8
Isambard Brunel	2	1806	1859	4	3
Manning	1	1808	1892	M—	H10
Darwin	2	1809	1882	10	6
Tennyson	3	1809	1892	2	10
George Richmond ...	3	1809	1896	10	3
Gladstone	1	1809	1898	8	6
John Bright ...	1	1811	1889	7	11
Thackeray	3	1811	1863	2	1

1 Name	2 C't'g'ry	3 Birth	4 Death	5 Child'n	6 Ch'd'n of Parents
John Lawrence ...	1	1811	1879	10	12
Archbishop Tait ...	1	1811	1882	9	8
Gilbert Scott ...	3	1811	1878	5	6
Dickens	3	1812	1870	10	8
Browning	3	1812	1889	1	2
Dalhousie	1	1812	1860	2	3
Livingstone ...	1	1813	1873	5	7
Charles Reade ...	3	1814	1884	S—	11
Charlotte Brontë ...	3	1816	1855	M—	4
Joseph Hooker ...	2	1817	1911	8	5
Delane	2	1817	1879	S—	9
G. F. Watts ...	3	1817	1904	M—	H7
"George Eliot" ...	3	1819	1880	M—	H4
Ruskin	3	1819	1900	M—	1
Florence Nightingale	1	1820	1910	S—	2
John Tyndall ...	2	1820	1893	M—	3
Herbert Spencer ...	2	1820	1903	S—	9
Richard Burton ...	1	1821	1890	M—	3
Matthew Arnold ...	3	1822	1888	5	9
Galton	2	1822	1911	M—	7
A. R. Wallace ...	2	1823	1913	M—	8
Kelvin	2	1824	1907	M—	7
Huxley	2	1825	1895	4	7
Dufferin	1	1826	1902	7	1
Speke	1	1827	1864	S—	7
Lister	2	1827	1912	M—	7
Holman Hunt ...	3	1827	1910	3	7
Meredith	3	1828	1909	3	1
D. G. Rossetti ...	3	1828	1882	M—	4
Millais	3	1829	1896	7	5
Leighton	3	1830	1896	S—	3
Salisbury	1	1830	1903	7	H10
Clerk-Maxwell ...	2	1831	1879	M—	1
Roberts	1	1832	1914	6	5
"Lewis Carroll"	3	1832	1898	S—	6
Wolseley	1	1833	1912	1	7
Seeley	2	1834	1895	1	10
Chamberlain ...	1	1836	1914	6	8
W. S. Gilbert ...	3	1836	1911	M—	4
Irving	3	1838	1905	2	1
Lecky	2	1838	1903	M—	H3
Cromer	1	1841	1917	3	9
H. M. Stanley ...	1	1841	1904	M—	1
Rayleigh	2	1842	1919	4	7
Sullivan	3	1842	1900	S—	2
Parnell	1	1846	1891	M—	11
R. L. Stevenson ...	3	1850	1894	M—	1
Rhodes	1	1853	1902	S—	11
Total after 1800—99	—	—	—	**261**	**599**